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September 17, 1999

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

BY HAND DELIVERY

Ms. Magalie R. Salas
Secretary
Office of the Secretary
Federal Communications Commission
The Portals TW-A325
445 12th Street, SW
Washington, DC 20554

BOSTON
DELAWARE
NEW YORK
SILICON VALLEY
SOUTHERN CALIFORNIA
TWIN CITIES
WASHINGTON, DC

**Re: Amendment of Part 2 of the Commission's Rules to Allocate
Additional Spectrum to the Inter-Satellite, Fixed, and Mobile
Services and to Permit Unlicensed Devices to Use Certain Segments
in the 50.2-50.4 GHz and 51.4-71.0 GHz Bands
ET Docket No. 99-261
Our File 09834/003001**

Dear Ms. Salas:

Enclosed please find an original and four (4) copies of comments submitted on behalf of the **International Microwave Power Institute (IMPI)** in the above-captioned proceeding. If you have any questions or concerns regarding this filing please contact me directly.

Very truly yours,


Terry G. Mahn

/seg
Enclosures

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

ET Docket No. 99-261

In the Matter of)

Amendment of Part 2 of the Commission's)
Rules to Allocate Additional Spectrum)
to the Inter-Satellite, Fixed, and)
Mobile Services and to Permit Unlicensed)
Devices to Use Certain Segments in the)
50.2-50.4 GHz and 51.4-71.0 GHz Bands)

To: The Commission

COMMENTS OF INTERNATIONAL MICROWAVE POWER INSTITUTE

On August 19, 1999, the International Microwave Power Institute (IMPI) requested a two-week extension of time to file comments in order to complete discussions with the Millimeter Wave Communications Working Group (MWCWG) on issues relevant to this docket. IMPI's request was granted by the Office of Engineering and Technology on August 27, 1999. Via their respective counsels, IMPI and MWCWG have had further discussions on these matters and IMPI now wishes to submit the following comments.

In connection with certain Part 15 "allocations" in ET Docket No. 94-124¹, MWCWG developed a spectrum etiquette to govern multiple unlicensed device usage in the 59-64 GHz band. On March 2, 1999, MWCWG filed a Petition for Rule Making with the Commission requesting that emission limits be established for ISM devices operating in the 61.25 GHz ISM band to avoid possible future interference to Part 15 devices using this spectrum. MWCWG stated that its etiquette required 5 GHz of neighboring spectrum and thus, required use of the ISM

¹ See Amendment of Parts 2, 15 and 97 of the Commission's Rules to Permit Use of Radio Frequencies Above 40 GHz for New Radio Applications, ET Docket No. 94-124, RM-8308, First Report and Second Notice of Proposed Rule Making, 11 FCC Rcd 4481 (1996).

band. IMPI vigorously opposed MWCWG's Petition for several reasons, including the potentially harmful impact that in-band limits could have on future ISM developments at 61.25 GHz. MWCWG's Petition is currently pending before the Commission.

In the instant docket, the Commission is proposing to authorize an additional 4 GHz of spectrum -- 2 GHz on either side of the 59-64 GHz band -- for Part 15 unlicensed use. Discussions between IMPI and MWCWG have concluded that this additional allocation would likely alleviate the concerns raised in MWCWG's Petition, such that limits in the ISM band should no longer be necessary. IMPI and MWCWG have agreed, therefore, that MWCWG's Petition should be placed "on hold" until this proceeding is completed and, if the proposed additional spectrum is made available for Part 15 use consistent with the MWCWG etiquette, the Petition could be dismissed for mootness.

Accordingly, for the reasons set forth above and addressed more fully in IMPI's Opposition to the MWCWG Petition (a copy of which is attached hereto for inclusion in the record), IMPI strongly supports the proposals to make the 57-59 GHz and 64-66 GHz bands available for unlicensed Part 15 use.

Respectfully submitted



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Counsel for International Microwave
Power Institute

September 17, 1999

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In the Matter of)
)
Amendment of Part 18 of the Commission's)
Rules to Update ISM Regulations)
and Promote Deployment of New)
High Bandwidth Communication Devices)

^{1/} By Public Notice dated April 21, 1999, the time for filing reply comments to the Petition was extended by the Commission to May 19, 1999.

Accordingly, IMPI urges the Commission to forbear from taking any action on the Petition and to defer, instead, to the international organizations currently studying the matter which have traditionally governed ISM usage of the electromagnetic spectrum.

INTRODUCTION

IMPI was founded in 1965 to promote the education, research, development and application of electromagnetic technologies, specifically microwave and RF. Since its founding, IMPI has become the largest non-profit information resource for ISM technologies with over 700 members and subscribers worldwide. IMPI has been previously active in various Commission proceedings involving ISM industry issues.^{2/}

The 61.25 GHz ISM band was adopted, along with four other bands, at the 1979 World Administrative Conference ("WARC-79") to address the ITU's concern over "an increasing amount of ISM equipment working on various frequencies throughout the spectrum."^{3/} As a condition to adopting this new ISM band into the ITU's Radio Regulations, the WARC-79 resolution provided that in-band limits were to be specified by CCIR (now called the ITU-R) in "collaboration with the CISPR and the IEC" in order to protect "radiocommunication services."^{4/} The conventional interpretation and understanding of this resolution was that such in-band limits, if any, would be set via international agreement and that the services to be protected were licensed radio. National limits to protect unlicensed devices was never the intent of, nor was it even contemplated by, the framers of the WARC-79 resolution.

^{2/} IMPI has been a vocal advocate against Part 15 usage of the ISM bands likely to lead to in-band limits on ISM (see, e.g., ET Dockets 98-6, 98-102 and 98-156).

^{3/} WARC-79 Resolution No. 63.

^{4/} Id.

Since 1979, national authorities have used the 61.25 GHz ISM band for research and experimentation in such areas as millimeter wave fusion. In the U.S., for example, the Department of Energy ("DOE") uses the 61.25 GHz band to heat magnetically contained plasmas for use in high gradient linear accelerators, cyclotron heating, ceramic sintering and other surface hardening applications. DOE also has a number of projects that rely on high power (200-500 kW) gyrotrons operating on this frequency. Research activities involving millimeter wave fusion are ongoing at other frequencies by federal government agencies and their contractors; in some cases the research is frequency dependent, in others it is not. In any event, the fact remains that when such research efforts culminate in commercial applications they will be forced to "locate" into one of the ISM bands set aside internationally for such purposes. The 61.25 GHz band is expected to play an important role in many of these developing applications.

IMPI has canvassed the industry to learn more about the current and future ISM applications in the 61.25 GHz band. Unfortunately, most of the activities are still in their research phase and, as a result, are highly confidential.^{3/} IMPI has been advised, however, that while some applications involve sealed units where emissions outside the system are thought to be minimal (e.g., accelerators), others must operate in a "pass-through" mode where high levels of emissions will make it extremely difficult to shield other spectrum users (e.g., continuous sheet feeding). Notwithstanding, most of these applications are not likely to obtain wide distribution even when commercialized, suggesting that the successful operation of 61.25 GHz radio systems can and should be deployed based on using conventional "site avoidance" considerations.

^{3/} CPI Palo Alto, for example, is a vendor of 61.25 GHz equipment and involved with experiments that are ongoing at Oak Ridge, Lawrence Livermore and other energy laboratories around the world.

1. The Commission is required by law to act in accordance with ITU regulations

The Commission is precluded from unilaterally adopting in-band emissions limits on ISM devices, as such limits would violate ITU regulations which the Commission itself has stated have the force of law. The ITU has always sought to protect and promote the development of ISM applications, a goal that would be thwarted by the imposition of differing, and possibly conflicting, national limits. Even the ITU amendments adopted in 1979, warning the ISM industry that limits might be imposed in the 61.25 GHz band, recognize that such limits are not the province of national authorities.

Article VI, Section 2 of the U.S. Constitution states that "[t]his Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be made, under the authority of the United States, shall be the supreme Law of the Land." Section 303(r) of the Communications Act provides that the Commission may make rules and regulations "not inconsistent with law" that are necessary to carry out "the provisions of this Act, or any international ... treaty, or regulations annexed thereto."

In recognizing its obligations, the Commission has repeatedly acknowledged that WARC Final Acts, once ratified by the United States, have the force of law as a treaty. For example, in modifying the Table of Frequency Allocations to comply with WARC-79, the Commission stated:

[T]he Final Acts of the 1979 WARC, which comprise an international treaty[,] became effective internationally on January 1, 1982, for administrations that have ratified the treaty. The United States ratified the treaty on September 6, 1983. Therefore, it now has the force of law in the United States and we are obliged to adhere to its provisions.^{6/}

^{6/} Amendment of Part 2 of the Commission's Rules Regarding Implementation of the Final Acts of the World Administrative Radio Conference, Geneva, 1979, Second Report and Order, 54 RR2d 1500, 1501, ¶ 1 (1983) ("WARC-79 Second Report and Order").

The Commission went on to add that "[i]n our domestic implementation actions, we must take full account of the international provisions even though in some instances they do not fully agree with those that the United States had proposed."^{7/} Accordingly, because ITU regulations and the WARC-79 Final Acts have the force of law, the FCC may not adopt regulations that are inconsistent with them.^{8/}

2. Unilateral adoption of in-band limits on ISM devices in the 61.25 GHz band would violate U.S. treaty obligations and thwart the ITU's goal of promoting the development of ISM applications

As noted, WARC-79 adopted five new frequency bands, including the 61.25 GHz band, for ISM operations.^{9/} In adding these bands to the international allocation table, the ITU "invited" the CCIR to work with CISPR to study emissions from ISM equipment to ensure adequate protection of radio services and to specify limits inside and outside the newly designated ISM bands. Subsequently, CCIR and CISPR formed a joint study group to fulfill the WARC-79 mandate. After 14 years of study, CCIR and CISPR ultimately decided not to recommend any specific in-band limits, but did recommend publication of a guide

^{7/} Id., 54 RR2d at 1503, ¶ 10. An example of the Commission's recognition that international treaties must be followed even when it disagrees, involved the 1981 updating of requirements for shipboard radios. There the agency stated that "[s]ince the U.S. agreed in an international convention to abide by these [noise] tolerances, it cannot change its position unilaterally and permit a vessel's call for help to go unheeded." In the Matter of Amendment of Part 83 of the Rules, Report and Order, 46 Fed. Reg. 19007 (March 27, 1981).

^{8/} Agency decisions have often been overturned as violative of U.S. treaty obligations. See e.g., Caterpillar Tractor Co. v. Commissioner of Patents and Trademarks, 650 F. Supp. 218, 219 (E.D. Va. 1986) overturning a U.S. Patent and Trademark Office ("PTO") rule interpreting a provision of the Patent Cooperation Treaty, finding that the PTO's rule was in conflict with the "plain meaning" of the treaty and therefore "not in accordance with law" under the Administrative Procedures Act, 5 U.S.C. Section 706(2)(A); Saaved v. Transmediterranean Airways, 509 F. Supp. 1167, 1169 (W.D. Mich. 1981), voiding a rule of the Civil Aeronautics Board precluding recovery from an airline for certain types of damages was in conflict with the Warsaw Convention, which the court described as "a treaty [that] is absolutely controlling in cases involving international transportation;" Rainbow Navigation Inc. v. Department of the Navy, 686 F. Supp. at 359-60 (D.D.C. 1988) (subsequent history omitted), overturning the Navy's efforts to "put Rainbow out of business" by enjoining enforcement of a Navy procurement regulation that otherwise would have denied Rainbow a shipping contract, finding that the Navy's rule was contrary to the "straightforward and unmistakable" language of the treaty requiring the award of the contract to Rainbow under the relevant bidding rules.

^{9/} These international allocations were implemented by the FCC in the WARC-79 Second Report and Order. The FCC did not make any special mention of ISM bands in that Order, nor do the United States reservations to WARC-79, repeated in Appendix B of the WARC-79 Second Report and Order.

(now, CISPR Publication 28) describing typical emission levels from ISM equipment. The CCIR/CISPR recommendation, published in 1994 by the ITU, found that "severe difficulties could arise if different limits were to be recommended by different international bodies for the same class of [ISM] equipment."^{10/} It also found that in-band limits "will decrease the usefulness of the ISM bands for industrial purposes [the result of which] would be to encourage the use of ISM equipment in frequency ranges more suitable to their processes, but detrimental to radio services."^{11/}

Unquestionably, CCIR/CISPR and the ITU were concerned that if national authorities were allowed to impose their own in-band limits on ISM devices, those bands would become useless for ISM purposes. Although there was a clear expression of ITU interest in the prospect of adopting in-band limits for ISM devices operating in the 61.25 GHz band, it was never contemplated that national authorities could unilaterally impose their own limits. Indeed, the fact that the WARC-79 resolution called upon the CCIR and CISPR to study the issue of in-band limits provides weighty evidence that any such limits would have to come from these international bodies and that national authorities lacked the power to impose such limits.

This is fully consistent with the ITU's historical treatment of ISM, which has always been exempted from any in-band limits. More specifically, the worldwide allocation of ISM spectrum and exemption from limits were designed to promote the harmonization and development of the ISM industry for the benefit of the international public. Differing national standards would, in the ITU's view, create "severe difficulties" for manufacturers and users of both ISM and radio services. It is not surprising, therefore, that in over 50

^{10/} "Recommendation ITU-R SM.1056, Limitation of Radiation From ISM Equipment", Preamble, ¶(m).

^{11/} Id., Section 3.1.

years since the ITU's adoption of the original ISM bands, no national authority has ever sought to impose in-band limits on any ISM device or application.^{12/}

3. The FCC has previously recognized it lacks authority to unilaterally impose in-band emission limits on ISM devices

The footnote accompanying the 61.25 GHz allocation states that "[t]he use of this frequency band for ISM applications shall be subject to special authorization by the administration concerned in agreement with other administrations whose radiocommunication services might be affected." 47 C.F.R. 2.106 footnote 911 (emphasis added). Despite the MWCWG's oblique reading of this footnote, it seems to recognize, if anything, that regulating ISM operations in this band requires international coordination and cooperation.

In preparation for the 1992 WARC, the Commission, at one point, considered proposing to the ITU a reallocation of the 2.45 GHz ISM band to accommodate Digital Audio Broadcast Services (DARS).^{13/} DARS was premised on serving domestic users only and its commercial success did not appear to depend on international cooperation regarding ISM band usage. Nonetheless, the Commission's decision to pursue a restructuring of the 2.45 GHz ISM band to accommodate DARS through the ITU signified its belief that any "tinkering" with ISM allocations required cooperation at the international level, even for those applications that were solely domestic in nature. That the Commission never considered carving up the ISM band or imposing in-band limits to accommodate DARS

^{12/} The "savings clause" in the ITU Constitution, Article 42 §193, is inapplicable here, as it operates only to matters that "do not concern members in general," thus precluding ISM band issues which concern members everywhere. Also, the ITU savings clause has traditionally been interpreted to deal with "radio services" and their cross-border impacts, matters not at issue here.

^{13/} In the Matter of An Inquiry Relating to Preparation for the ITU WARC for dealing with Frequency Allocations in Certain Parts of the Spectrum, Gen. Docket No. 89-544, Second Notice of Inquiry, 5 FCC Red 6046, 6061 ¶¶ 102-03 (1990). Ultimately, the idea was dropped when the Commission became aware that manufacturers and users heavily depended on the entire 2.45 GHz band for ISM operations. See In the Matter of An Inquiry Relating to Preparation for the ITU WARC for dealing with Frequency Allocations in Certain Parts of the Spectrum, Gen Docket No. 89-544, Report, 69 RR2d 484, 494 ¶ 73 (1991).

through a domestic rulemaking underscored its correct understanding that such activities were off-limits to ITU-signatory national authorities.

4. Even if the Commission had the authority to set in-band limits on ISM it should defer to the ITU

In early 1998, the MWCWG proposed in-band limits in the 61.25 GHz ISM band via a draft study question submitted to US Working Party 1A (WP1A), the federal government-led group representing U.S. interests before ITU Radiocommunications Study Group 1. IMPI participated in the WP1A meetings in which the draft study question was discussed, as did Commission staff. Initially, IMPI voiced strong objections to the MWCWG draft for a host of reasons including the apparent exclusion of IEC/CISPR from any formal involvement on ISM issues. Commission staff involved with WP1A met with IMPI representatives in an effort to resolve their objections. At the Commission's urging, IMPI dropped its opposition to the draft study question, provided it was amended to include a recommendation that the ITU "request appropriate collaboration from IEC/CISPR" on 61.25 GHz band compatibility, and provided the Commission agree not to undertake any Notice of Inquiry or Rulemaking proceedings on compatibility issues in the 61.25 GHz band while the Study Question was before the ITU and IEC/CISPR.^{14/} Subsequently, the Commission offered the agreed-to amendment to the draft study question,^{15/} which was adopted by WP1A, submitted to the ITU-R Study Group 1 and officially adopted in July, 1998.

To begin a rulemaking proceeding on 61.25 GHz compatibility while the matter is before the ITU would be potentially wasteful of scarce governmental resources as it will involve the duplication of work by various US officials and agencies currently engaged in both ITU and Commission activities. On this basis alone, the Petition suffers questions of

^{14/} See T.G. Mahn letter of April 29, 1998, to William Luther, Chief of Radiocommunication Policy Satellite & Radio Division.

^{15/} Contrary to what the Petition asserts (Petition at 7), the Commission did not "co-author" the Study Question.

both ripeness and exhaustion: it is unripe because it asks the Commission to decide purely hypothetical issues of spectrum interference (see Section 5 below); and the petitioners have yet to exhaust the process of the international regulatory body with original jurisdiction on the matter, rendering it premature for Commission consideration. Accordingly, the Commission must dismiss the Petition or risk the very real possibility of reaching inconsistent and conflicting positions with US officials currently involved in the ITU Study Group proceedings.

5. The Petition fails to make any case for limits on ISM

MWCWG states that its members "have concluded" that the widespread deployment of ISM devices in the 61.25 GHz band will "threaten the successful operation of communication devices in the 59-64 GHz band unless these ISM devices meet reasonable in-band emission limits." Petition at 2. Nowhere in its Petition, however, does MWCWG provide factual support for such conclusions.

Part 15 devices operate successfully throughout much of the spectrum under the "shadow" of much higher power licensed emitters, and are given no protection from interference by any other licensed or unlicensed emitters. Should the Commission take the unprecedented step of protecting any class of Part 15 devices, it should first have a firm understanding of various technical issues involved, including the signal characteristics of possible in-band emitters and rejection properties of in-band receivers. Once these and other issues are understood, an assessment can be made as to the commercial and technical feasibility of the various options and informed decisions made on device limits, spectrum sharing and band priorities.

Unfortunately, the Petition provides no such technical information. Yet, it seeks protection for unlicensed devices on the sheer speculation that unless the Commission imposes Part 15 limits on ISM, "potential users . . . face the prospect of unconstrained deployment of ISM devices with unlimited and unpredictable emissions." Petition at 4.

According to the Petition, even the threat of ISM interference could thwart the development of unlicensed devices and prevent investment "entirely." Petition at 5.^{16/}

Claims of this magnitude should be backed by hard evidence, with examples laid bare of where ISM applications have drowned out unlicensed operations in ISM bands. No such examples are provided because none exist. In the 915 MHz, 2.45 GHz and 5.8 GHz ISM bands, unlicensed device operations very similar to those proposed by the MWCWG have been thriving for years and investments are literally flooding into these businesses despite scores of diverse ISM applications in the bands.^{17/}

Of further significance, the 61.25 GHz band has been described as one with "extremely limited propagation range"^{18/} even for short range radio devices. How such short range devices are likely to be interfered with by yet unknown ISM applications given these signal propagation limitations is explained nowhere in the Petition. Notwithstanding these failings, the MWCWG would have the Commission believe that its technology is in grave and imminent danger despite admitting that there is "little or no ISM use of the 61.25 GHz band [and] no ISM products that operate in this band have been offered for sale." Petition at 8. With no apparent appreciation for the irony of the remarks, the MWCWG asks

^{16/} The Petition also states incorrectly that the Commission "has never expressly or implicitly granted to ISM users any 'right' to unfettered operations within the ISM bands." Petition at 5. Quite the opposite, the Commission has repeatedly recognized the rights of ISM users, which it defines as follows:

[w]e note that Part 18 is an authorized service. Part 18 devices are permitted to radiate without a limit on the level of radiation only in those frequency bands in which ISM operation is the primary authorized service. Part 18 devices operated in this manner are not required to provide any protection from interference to other authorized services located within the ISM bands.

See Revision of Part 15 of the rules regarding the operation of radio frequency devices without an individual license, Gen. Docket No. 87-389, First Report and Order, 66 RR2d 295, at ¶ 60.

^{17/} See, e.g., <http://www.bluetooth.com>, boasting of nearly 700 companies that have adopted the "Bluetooth" protocol for 2.45 GHz RLANS.

^{18/} See In the Matter of Amendment of Parts 2, 15 and 97 of the Commission Rules to Permit Use of Radio Frequencies Above 40 GHz for New Radio Applications, ET Docket No. 94-124, First Report and Order and Second Notice of Proposed Rulemaking, 11 FCC Rcd. 4481 (1995), fn 6.

the Commission to set stringent limits on ISM devices that do not exist, which may never be commercialized, and even if produced might never interfere with the products the MWCWG manufacturers intend to, but have not yet, offer for sale.

Because MWCWG has utterly failed to sustain its legal and factual burden of proof that such drastic action is warranted, the Petition must be dismissed.

6. The Petition can only speculate that no harm will come to ISM from the imposition of limits

The Petition claims that the application of Part 15 limits would not impose "an unreasonable burden on the ISM community" (Petition at 8), but only an "incremental burden on ISM manufacturers." Petition at 11. To make such sweeping assertions, the MWCWG must have some crystal ball since it is impossible, at this point, to predict how the band will be used in the future or what public benefits will flow from 61.25 GHz ISM applications. Converting the ISM band to a "Part 15 band," which is what the Petition seeks to do, will surely stifle some, if not many, ISM applications in the band. Thus, it cannot be assumed, as the Petition does, that the ISM community will not be burdened or that the public interest will be served by setting limits in the band.

If anything, the Petition makes the case that setting in-band limits now would be premature. The premise for limits is the MWCWG's fear of "widespread deployment" of ISM devices, implying clearly that if there were no threat of widespread deployment, limits would not be unnecessary. But, if there truly is the possibility of widespread ISM deployment as the Petition claims, neither the MWCWG nor the Commission can know now what those ISM applications might be, how important they might be to the public or, more importantly, whether the public is better served by these ISM applications than by another untested, unlicensed wireless technology like the one proposed by petitioners.

The Petition claims, again without basis, that the 59-64 GHz spectrum is unique, unusual and "the only contiguous 5 GHz of bandwidth available, or likely to be available" for the applications envisioned by the MWCWG. Petition at 4. This overstates the matter considerably. The Commission is constantly "re-farming" the spectrum, particularly at the higher frequencies, so the MWCWG can only speculate as to what future broadband allocations might be available. Moreover, the Commission is in the midst of a Notice of Inquiry on ultra-wideband (UWB) emitters which hold the promise for the same types of unlicensed wireless applications touted in the Petition, yet with even greater bandwidths^{19/}.


Simply put, the MWCWG can only guess as to benefits of their technology or to the potential harm that may befall 61.25 GHz ISM applications, a plainly insufficient basis on which to begin a rulemaking proceeding.

CONCLUSION

Wherefore, based on the foregoing considerations, IMPI requests that the Petition of Rulemaking submitted by the MWCWG be dismissed with prejudice by the Commission.

Respectfully submitted,

**INTERNATIONAL MICROWAVE
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^{19/} See In the Matter of Revision of Part 15 of the Commissioner's Rules Regarding Ultra-Wideband Transmission Systems, ET Docket No. 98-153, 63 Fed. Reg. 59184 (Sept. 21, 1998).